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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,046	10/28/2003	Takayuki Ito	04329.3167	7595

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EXAMINER

TOBERGTE, NICHOLAS J

ART UNIT	PAPER NUMBER
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2823

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/694,046	Applicant(s) ITO, TAKAYUKI	
	Examiner Nicholas J. Tobergte	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-12 and 14-26 is/are pending in the application.
- 4a) Of the above claim(s) 16-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12, 14, 15, 25, 26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>1/31/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 1/31/07 have been fully considered but they are not persuasive. Pertaining to claim 1, Applicants contend that Gofuku fails to teach entirely implanting electrically inactive first impurity to one main surface of a semiconductor substrate. This is not persuasive. Gofuku teaches implanting an electrically inactive impurity to one main surface of a semiconductor substrate. Since Gofuku completes the implantation, then in the broadest sense, Gofuku has "entirely" implanted the impurity. Furthermore, "one main surface of a semiconductor substrate" is so broad in that it certainly can include the Applicants assertion of Gofuku teaching that the impurities are implanted in a region within a layer formed in an opening portion of the semiconductor substrate. "One main surface of a semiconductor substrate" does not exclude and certainly encompasses a region within a layer formed in an opening portion of the semiconductor substrate. Also, claim 1 fails to exclude that an electrically active impurity is not implanted. Claim 1 states that the method comprises the steps and as such does not exclude any other possible steps. Gofuku does teach an electrically inactive impurity as admitted by the Applicants.

Specification

The amendment filed 1/31/07 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material

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which is not supported by the original disclosure is as follows: "entirely implanting electrically inactive first impurity to the one main surface of the semiconductor substrate provided with the gate electrode, excluding a region below the gate electrode".

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 9-12, 14, 15 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amendments to the claim and the specification filed 1/31/07 introduced new matter. The limitation in the specification, "entirely implanting electrically inactive first impurity to the one main surface of the semiconductor substrate provided with the gate electrode, excluding a region below the gate electrode", specifically the underlined portion, had no support in the invention as originally filed and as such constitutes new matter. A negative limitation amended into the specification and claims must have support in the originally filed disclosure.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gofuku (US 6,190,911).

Pertaining to claim 1, Gofuku teaches a method of manufacturing a semiconductor device, comprising:

entirely implanting electrically inactive first impurity to one main surface of a semiconductor substrate; and

carrying out heat treatment with respect to the semiconductor substrate to which the first impurity is implanted. **See Claim 1**

Gofuku fails to specifically detail that the heat treatment is carried out by light.

However, it would have been notoriously obvious to one of ordinary skill in the art at the time the invention was made to choose light (i.e. a lamp) as a heat treatment means.

The use of light as a means for heating is not inventive since it is well known to one of ordinary skill in the art that light generates some amount of thermal energy and it would have been obvious to select a well known method of heating. See also In re Leshin,

227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious)

Pertaining to claim 2, Gofuku teaches the method according to claim 1, further comprising:

implanting electrically active second impurity having predetermined conduction type to the semiconductor substrate before the heat treatment is carried out; and

carrying out the heat treatment with respect to the semiconductor substrate to which the first and second impurities are implanted, and thereby activating the second impurity. **See Claim 1.**

Pertaining to claim 3, Gofuku teaches the method according to claim 1, wherein the first impurity is ion-implanted to the surface layer of the semiconductor substrate at concentration of $1 \times 10^{19} \text{ cm}^{-3}$ or more. **See Claim 1.**

Pertaining to claim 4, Gofuku teaches the method according to claim 1, wherein at least one of the group IV-A is used as the first impurity. **See Claim 1, Ge and Sn are IV-A elements**

Claims 5, 7, 8 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gofuku as applied to claims 1-4 above, and further in view of Arai et al (US 4,504,323).

Pertaining to claim 5, Gofuku teaches the method according to claim 1, but fails to teach a pre-heating step to less than 600 degrees C before carrying out the heat treatment, wherein the heat treatment being flash lamp annealing carried out under conditions that light emitting time is 100msec or less and irradiation energy density is 100 J/cm^2 or less.

Arai teaches a pre-heating step to less than 600 degrees C. Arai also teaches that heating can be done using a xenon lamp or any flash discharge lamps. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the well known and obvious heating techniques as taught by Arai and apply them to the teaching of Gofuku because they are well known and established alternative to the heat treatment as taught by Gofuku.

Pertaining to claims 7 and 8, Gofuku in view of Arai teaches the method of claim 6, but fails to teach carrying out said pre-heating to the semiconductor substrate using at least one of hot plate, heating lamp and laser beams. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to use the lamps as a means for pre-heating the wafer before performing the final anneal using the lamps. See also Timans et al (US 6,951,996) which discusses various pre-heating and heating steps for semiconductor annealing. Choosing and or reordering well known procedures or methods to one of ordinary skill in the art is not inventive. See also Ex parte Rubin , 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a

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laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.). See also *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) (selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results); *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930) (Selection of any order of mixing ingredients is prima facie obvious.).

Pertaining to claim 25, Gofuku teaches a method of manufacturing a semiconductor device comprising:

entirely implanting at least one group IV-A elements as electrically inactive first impurity to one main surface of a semiconductor substrate; and

carrying out heat treatment by light with respect to the semiconductor substrate to which the first impurity is implanted. **See rejection of claim 1 above.**

Gofuku fails to teach wherein the light has a main spectrum in range of wavelength shorter than silicon (Si) absorption end, and emitting time of the light being 100 msec or less. (Note, Xenon flash lamp fulfills this requirement).

Arai teaches heating using a xenon flash lamp as shown in the rejection of claim 5 above. Therefore it would have been obvious to one of ordinary skill in the art at the

time the invention was made to select one of the appropriate heating means as taught by Arai, because they are shown to be obvious substitutes for the heating method as taught by Gofuku. See also rejection of claims 7 and 8 above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas J. Tobergte whose telephone number is 571-272-6006. The examiner can normally be reached on Mon - Thur 7am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NJT


MICHELLE ESTRADA
PRIMARY EXAMINER